

container having an inactive catalyst support.

(2) Petroleum-fueled and methanol-fueled diesel engines. Either a chassis-type or a facility-type exhaust system or both systems simultaneously may be used. If the engine is equipped with an exhaust aftertreatment device, the exhaust pipe must be the same diameter as found in-use for at least 4 pipe diameters upstream to the inlet of the beginning of the expansion section containing the aftertreatment device. The exhaust backpressure or restriction shall follow the same criteria as in § 86.1330-90(f) and may be set with a valve (muffler omitted). The catalyst container may be removed during all test sequences prior to the practice cycle, and replaced with an equivalent container having an inactive catalyst support.

(i) The engine exhaust systems shall meet the following requirements:

(A) The total length of the tubing from the exit of the engine exhaust manifold, turbocharger outlet or aftertreatment device to the primary dilution tunnel shall not exceed 32 feet (9.8 m).

(B) The initial portion of the exhaust system may consist of a typical in-use (i.e., length, diameter, material, etc.) chassis-type exhaust system.

(C) The distance from the exhaust manifold flange(s) or turbocharger outlet to any exhaust aftertreatment device shall be the same as in the vehicle configuration or within the distance specifications provided by the manufacturer.

(D) For engines which are not equipped with exhaust aftertreatment devices, all tubing in excess of 12 feet (3.7 m) from the exit of the turbocharger or exhaust manifold shall be insulated. For engines equipped with exhaust aftertreatment devices, all tubing after the aftertreatment device which is in excess of 12 feet (3.7 m) shall be insulated.

(E) If the tubing is required to be insulated, the radial thickness of the insulation must be at least 1.0 inch (25 mm). The thermal conductivity of the insulating material must have a value no greater than 0.75 BTU-in/hr/ft<sup>2</sup>/°F (0.065 W/m-K) measured at 700 °F (371 °C).

(F) A smoke meter or other instrumentation may be inserted into the exhaust system tubing. If this option is exercised in the insulated portion of the tubing, then a minimal amount of tubing not to exceed 18 inches may be left uninsulated. However, no more than 12 feet (3.66 m) of tubing can be left uninsulated in total, including the length at the smoke meter.

(ii) The facility-type exhaust system shall meet the following requirements:

(A) It must be composed of smooth tubing made of typical in-use steel or stainless steel. This tubing shall have a maximum inside diameter of 6.0 in (15 cm).

(B) Short sections (altogether not to exceed 20 percent of the entire tube length) of flexible tubing at connection points are allowed.

[58 FR 16064, Mar. 24, 1993, as amended at 59 FR 48533, Sept. 21, 1994; 60 FR 34374, June 30, 1995; 62 FR 47130, Sept. 5, 1997]

**§ 86.1327-98 Engine dynamometer test procedures; overview.**

Section 86.1327-98 includes text that specifies requirements that differ from § 86.1327-96. Where a paragraph in § 86.1327-96 is identical and applicable to § 86.1327-98, this may be indicated by specifying the corresponding paragraph and the statement “[Reserved]. For guidance see § 86.1327-96”.

(a) through (d)(3) [Reserved]. For guidance see § 86.1327-96.

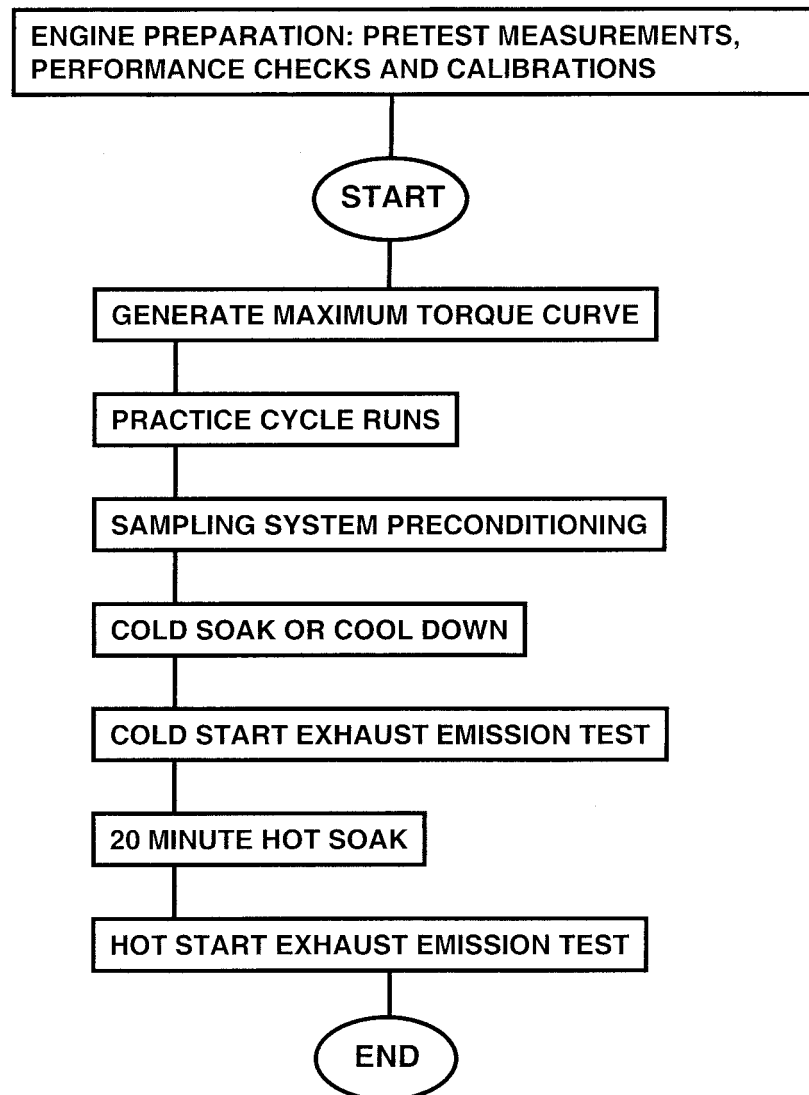
(d)(4) Additional accessories (e.g., oil cooler, alternators, air compressors, etc.) may be installed or their loading simulated if typical of the in-use application. This loading shall be parasitic in nature and, if used, shall be applied during all engine testing operations, including mapping. The accessory work performed shall not be included in the integrated work used in emissions calculations.

(d)(5) through (f) [Reserved]. For guidance see § 86.1327-96.

[62 FR 47130, Sept. 5, 1997]

**§ 86.1330-90 Test sequence; general requirements.**

(a) The test sequence shown in Figure N90-10 shows the major steps of the test procedure, as follows:

**Figure N90-10 Test Sequence**

(b) *Control of air temperature.* (1) The temperature of the CVS dilution air shall be maintained at greater than 68 °F (20 °C) for Otto cycle engines and between 68 °F and 86 °F (20 °C and 30 °C) for diesel cycle engines throughout the test sequence, except as permitted by § 86.1335-84.

(2) For engines with auxiliary emission control devices which sense or detect ambient air temperature and operate at 68 °F or higher, the test cell ambient air temperature and the temperature of the engine intake air shall be maintained at 77 °F  $\pm$  9 °F (25 °C  $\pm$  5 °C) throughout the test sequence. For engines with auxiliary emission control devices which are temperature dependent and operate at 68 °F or higher, the temperature of the engine intake air shall be maintained at 77 °F  $\pm$  9 °F (25 °C  $\pm$  5 °C) throughout the test sequence.

(3) For engines which are not equipped with temperature dependent auxiliary emission control devices, the test cell ambient air temperature and the temperature of the engine intake air shall be greater than 68 °F (20 °C). No corrections will be made in test results or measured engine power if 86 °F (30 °C) is exceeded.

(4) The only exceptions to these temperatures are as noted in § 86.1335.

(5) For engines equipped with an air-to-air intercooler (or any other low temperature charge air cooling device) between the turbocharger compressor and the intake manifold, the procedure for simulating the device in the transient dynamometer test facilities shall follow the SAE Recommended Practice J1937, "Engine Testing with Low Temperature Charge Air Cooling System in a Dynamometer Test Cell."

(c) No control of ambient air, engine intake or CVS dilution air humidity is required (dehumidification of the dilution air prior to entering the CVS is allowed).

(d) The idle test of subpart P may be run after completion of the hot start exhaust emission test, if applicable.

(e) The barometric pressure observed during the generation of the maximum torque curve shall not deviate more than 1 in. Hg. from the value measured at the beginning of the map. The average barometric pressure observed during the exhaust emission test must be within 1 in. Hg. of the average observed during the maximum torque curve generation.

(f) *Petroleum-fueled and methanol-fueled diesel engines.* (1)(i) Air inlet restriction shall be set to a value midway between a clean filter and the maximum restriction specified by the man-

ufacturer. The exhaust restriction normally shall be set at 80 percent of the manufacturer's recommended maximum specified exhaust restriction. The manufacturer shall be liable for emission compliance from the minimum in-use restrictions to the maximum restrictions specified by the manufacturer for that particular engine.

(ii) Inlet depression and exhaust backpressure shall be set with the engine operating at rated speed and wide open throttle, except for the case of inlet depression for naturally aspirated engines, which shall be set at maximum engine speed and nominal zero load (high idle).

(iii) The location at which the inlet depression and exhaust backpressure is measured shall be specified by the manufacturer.

(iv) The settings shall take place during the final mode of the preconditioning prior to determining the maximum torque curve.

(2)(i) The temperature of the inlet fuel to the engine shall not exceed 110 °F (or 130 °F during the first 10 seconds of the hot start test).

(ii) The pressure of the inlet fuel and the point at which it is measured shall be specified by the manufacturer.

(g) Pre-test engine measurements (e.g., governed petroleum-fueled or methanol-fueled diesel engine high idle speed, petroleum-fueled or methanol-fueled diesel engine fuel flows, etc.), pre-test engine performance checks (e.g., verification of actual rated rpm, etc.) and pre-test system calibrations (e.g., inlet and exhaust restrictions, etc.) shall be made prior to generation of the maximum torque curve. This can be done during engine preconditioning, or at the manufacturer's convenience subject to the requirements of good engineering practice.

[54 FR 14597, Apr. 11, 1989, as amended at 60 FR 34374, June 30, 1995; 62 FR 47131, Sept. 5, 1997; 66 FR 5184, Jan. 18, 2001]

**§ 86.1332-90 Engine mapping procedures.**

(a) Mount test engine on the engine dynamometer.

(b) Determine minimum mapping speed. The minimum speed is defined as the warm engine curb idle rpm.